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ABSTRACT

This study tests the effects on student achievement and attitude of two methods of reviewing homework problems in mathematics. One review procedure involved solving and explaining each homework problem the day after an assignment was made. In the second procedure, only the problems that students requested to have reviewed were covered. Two Algebra I classes were involved in this research with one procedure used in each class. Upon the completion of a unit test, the homework review methods were alternated between the two classes. The study found that: (1) there was no significant difference in achievement between treatments for either class; (2) there was no significant difference between classes in achievement when using different review procedures: and (3) students generally preferred to review only homework problems they requested. The research suggests that the preferred method of reviewing should be some combination of the two methods described, with the difficulty of the topics and interests of the students used as the bases for the instructor's decision regarding review style choice. (MP)

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AN EXPERIMENTAL STUDY OF THE EFFECTS OF REQUIRED HOMEWORK REVIEW VERSUS REVIEW ON REQUEST UPON ACHIEVEMENT

A Thesis

Presented to

the Faculty of the Department of Teacher Education

Western Kentucky University

Bowling Green, Kentucky

In Partial Fulfillment

of the Requirements for the Degree

Specialist in Education

by

Dolores Dick

July 1980

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AN EXPERIMENTAL STUDY
OF THE EFFECTS OF REQUIRED HOMEWORK REVIEW
VERSUS REVIEW ON REQUEST UPON ACHIEVEMENT

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AN EXPERIMENTAL STUDY
OF THE EFFECTS OF REQUIRED HOMEWORK REVIEW
VERSUS REVIEW ON REQUEST UPON ACHIEVEMENT

Dolores Dick July 1980 36 pages

Directed by: James Koper, Gene Harryman, and Wilburn Jones

Department of Teacher Education-Western Kentucky University

During the 1979-80 school year, two Algebra I classes were involved in a study to test the effects of two methods for reviewing homework problems on students' achievements and attitudes. One review procedure was to solve and explain each problem during the class period that followed the class period in which the homework assignment had been made. The other procedure involved solving and explaining only the problems that students requested to have reviewed. While one procedure was being used with one class, the other procedure was being used with the comparison class. One treatment procedure was used with a class until a unit of work was completed. After a unit was completed a teacher-made, achievement test was administered to the students in both classes. The raw scores were normalized with a mean of fifty and a standard deviation of ten. At the beginning of the next unit the review procedures were alternated between the two classes. The two classes covered fourteen units during the experimental period.

At the conclusion of the study, each student had fourteen normalized achievement scores on record. The scores were the basis for testing the following: the effect of the review

procedures on achievement within each class and the effect of the review procedures on achievement between classes.

A survey to obtain the attitudes of students toward the two procedures was conducted at the conclusion of the experimental period.

There was no significant difference in achievement between treatments for either class.

There was no significant difference in achievement between classes when using different review procedures.

Students preferred to review only homework problems they requested.

The following conclusions were based upon the findings of this study. Homework appears necessary for the attainment of desirable proficiency in Algebra I classes. The method of reviewing homework should be a combination of reviewing all of the homework assigned and reviewing only the problems that are requested by students. The difficulty of the topics and the interest of the students should be the bases for the teacher's decision regarding which review method should be used for any specific homework assignment.

CHAPTER I

INTRODUCTION

The first schools to be built in the United States were colleges. In the beginning of our country's history there were no secondary schools as we know them. The people believed they could teach their children in their own homes. By the time of the American Revolution many people had taught their children to read well enough that they could read a newspaper. Funding for public schools was not available until after the Civil War.[1]

Perhaps we can actually think of homework assignments beginning in the early history of our country since parents taught their children in their own homes. However homework assignments in the secondary schools as we think of them did not begin until the twentieth century. During this century homework has become a significant part of teaching strategies.

In many high schools homework is a big factor in determining the student's letter grade. Generally homework is thought to be work assigned to be completed outside of the classroom; however, several factors in our present society

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[1]Interview with Helen Crocker, History Professor at Western Kentucky University, Bowling Green, Kentucky, 28 July 1979.

cause many students to have difficulty in finding time to complete homework assignments outside of class. As a result some teachers allow time in class for students to work on homework assignments.

Teachers in general are faced with many important questions concerning homework assignments. How often should homework be assigned? How do homework assignments affect achievement? Does homework affect the student's attitude toward the subject? How does the teacher most effectively utilize homework assignments? Mathematics teachers are especially faced with these questions concerning homework assignments since most mathematics teachers feel that students need more drill than they can get in the classroom. Some of these questions were under investigation in this study. Homework assignment in this study was defined as a unit of work assigned to the student to be completed prior to next class meeting. The homework assignment was then done either outside of class or begun during the class period depending upon the experimental treatment being used for that class.

The purpose of this study was to examine the effects of two different approaches in reviewing homework assignments on mathematics achievement. In one approach all of the homework assignment from the previous day was explained using the overhead projector; then new material was presented. In this approach there was no class time to work on the current homework assignment.

In the other approach, the only homework problems worked were ones requested by students. In general the overhead projector was used in explanation of the requested problems. The new material was then presented and time remaining students worked on the homework assignment.

The researchable problem was as follows: Will students who are shown how to work all of the previously assigned homework problems attain a higher achievement than students who see only requested homework problems worked?

Throughout the school year, the two approaches for reviewing homework were systematically exchanged between the two algebra classes. While one class was receiving one treatment the other class was receiving the second treatment. After the unit test the treatments were exchanged.

There were some delimitations of the study. This study considered only the effects of homework upon achievement for Algebra I students. All Algebra I students were enrolled in the author's two classes at Warren Central High School.

There were several limitations to the study. The major threats to internal validity were having two intact groups, having a morning and afternoon class, and not having a standardized instrument to measure achievement.

The students for the two algebra classes were not randomly assigned to the treatment groups due to the scheduling of classes. One algebra class, third period, met in the morning just before lunch; while the other algebra class,

sixth period, met just before the end of the school day. By sixth period students and the teacher were tired and the students were anxious to get out of school.

All the tests given were teacher-made achievement tests designed to measure the objectives for each unit.

One threat to external validity was that this year's algebra students may not be typical of the students in the past or students in the future. Another threat to external validity is what is known as the Hawthrone effect. Students may have performed differently realizing they were involved in a study. Another threat to external validity was that the achievement of a student might be affected differently if he had been given only one treatment throughout the school year rather than alternating methods.

CHAPTER II

REVIEW OF LITERATURE

Throughout the last century educators have been concerned with the issue of homework. Does homework improve achievement? Studies have been conducted concerning homework versus no homework and its effect upon the academic achievement of the student. These studies have been conducted in subjects such as mathematics, English, and social studies at the elementary, junior high, secondary, and college level.

In January, 1979, Charles D. Friesen published The Results of Homework versus no Homework, Research Studies in which he summarized the results of twenty-four research studies concerning the effects of homework and no homework on academic achievement. Many of the following studies referred to in this chapter are taken from Friesen's summary of studies on homework.[1]

Beauchamp did a study in 1923 in a high school science class to determine if definite homework assignments affected achievement. From his study he concluded that definite assignments did result in superior performance of the student.[2]

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[1]Charles D. Friesen. The Results of Homework versus no Homework Research Studies (Bethesda, MD: ERIC Document Reproduction Service, ED 167 508, 1979), p. 1-15.

[2]Ibid., p. 1.

A study was conducted between 1927 and 1932 by Carmichael in grades five through eight in El Segundo, California. The students were assigned homework during the first three years, and no homework was assigned during the last three years. The students were given a battery of Standard Achievement Tests. Based upon these scores he concluded that there was a slight, but non-significant, difference favoring the homework.[3]

In a follow-up study Carmichael and Crawford (1937) found a drop in high school grades among those pupils who attended El Segundo elementary school after homework was abolished.[4]

In 1934, Steiner conducted a study involving homework in the seventh grade. He concluded that regular homework led to gains in achievement in arithmetic and English grammar.[5] Thirty-nine students were involved in the study. Two equivalent groups were formed. One group had English homework and the other had arithmetic homework. The groups spent the same amount of time on homework. Small but consistent differences were found favoring homework.

In Birmingham, Alabama, in 1935, Cooke and Brown conducted a study to determine the relationship between the amount of homework and scholastic achievement in grades five through eight. The New Standard Achievement Test, Advanced

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[3]Ibid.

[4]Ibid.

[5]Ibid., p. 2.

Examination was used as a pretest and as a posttest. During the three months the study was conducted, the parents reported the amount of time their children studied arithmetic, history and reading. Cook and Brown found no significant relationship between the amount of time spent on doing homework and scholastic achievement.[6]

In 1935, Teahan conducted a study dealing with the effects of homework. The study covered a period of 115 days and included grades six, seven and eight. Two of the four classes under study were assigned homework; the other two classes were not assigned homework. The Stanford Achievement Test was used as both a pretest and a posttest. Teahan found no significant difference in the achievement of the two groups.[7]

DiNapoli conducted an extensive study in an elementary school in 1937. Comparisons were made between two groups of students. In one group, homework was compulsory; whereas in the other group homework was voluntary. DiNapoli sought to determine if compulsory homework improved the academic achievement of the student. He discovered that fifth graders achieved slightly better with compulsory homework while the reverse was true for seventh graders. He concluded that the teacher needs to be flexible in dealing with assignments.[8]

Anderson in 1946 did a study in a junior high school comparing a group of students given homework assignments and

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[6]Ibid.

[7]Ibid., p. 3.

[8]Ibid.

a group of students given no homework assignments. Students who were assigned homework showed higher achievement gains in English, social studies and mathematics than students who were not assigned homework. The bright student achieved well in both groups, however, slightly higher achievements were observed in the homework group. The average student and the below average student in the no-homework group achieved significantly lower than the average student and the below average student in the homework group.[9]

Schain in 1954 did a limited experiment in an American history class. He compared the results of homework versus no homework and its effects upon academic achievement. He found that bright students achieved slightly better in the homework group than in the no homework group. Although bright students did well in either group, the average student in the homework group scored slightly better on both the daily quizzes and the essay tests than the average student in the no homework group. The students with the low IQ's achieved much better in the homework group than low IQ students in the no homework group.[10]

Strang conducted a study in 1955 in an elementary school and discovered that the correlation coefficient between the school marks and time spent on homework was low but positive.[11]

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[9] Ibid., p. 4.

[10] Ibid.

[11] Ibid.

In 1957, Hines conducted a one year study in two plane geometry classes. Students were matched on the basis of age, intelligence, and first year algebra grades. There were nineteen matched pairs which were randomly assigned to the two classes. The experimental group had no homework assignments while the control group had homework two or three times a week. Hines found that the scores on each test and on the cumulative tests were higher when the students were given homework assignments. If the students had been evaluated only on test scores, homework assignments would have increased their grades by one letter grade. However, there were some limits to Hines' study--only sixteen of the nineteen pairs were used and each group was taught by a different teacher.[12]

In 1960, Schroder conducted an experiment with Algebra I classes. Students in the experimental group completed daily assignments during class. Students in the control group were assigned daily assignments to be done outside of class. The results of standardized tests showed no significant difference in achievement between the two groups. However, students in the homework group scored higher on teacher-made tests than the students in the no homework group. Schroder concluded that it was doubtful that assignments to be completed outside of class benefited the students.[13]

In 1960, Goldstein reviewed thirty years of research on homework and concluded that preconceived ideas about the

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[12]Ibid., p. 5.

[13]Ibid.

value of homework have often interferred with the interpretations of research findings. He reported that the results of most homework studies are inconclusive and statistically insignificant, but the few significant findings seem to suggest that homework promotes higher academic achievement in the upper elementary and secondary grades, for some pupils in some subjects.[14]

In 1965, Hudson investigated the amount of assigned homework and its effects upon scholastic achievement in seventh grade. He found that the amount of homework assigned had no significant relationship to scholastic achievement in arithmetic concepts. However, scholastic achievement in arithmetic problem-solving might be influenced by the amount of homework assigned.[15]

In 1965, an experiment involving three groups was conducted by Kock in sixth-grade arithmetic. The groups were students given (1) long assignments, (2) short assignments and (3) no assignments. The Iowa Tests of Basic Skills-Form 1 was used as a pretest and the results showed no significant difference in achievements between groups. The results from the posttest, Iowa Tests of Basic Skills-Form 2 indicate that daily homework increased the student's computational skills.[16]

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[14] Ibid.

[15] Ibid., p. 6.

[16] Ibid., p. 7.

In 1966, Whelan conducted an experiment in English and mathematics using four hundred fourth grade students equated by age, sex, and intelligence. The experimental group had homework assignments in English and mathematics while the control group was assigned no homework. Whelan found that those students with homework assignments did not achieve higher than those students with no homework.[17]

In 1967, Mason conducted a study involving students in a college algebra course. The students were divided into two groups, a homework group consisting of 241 students and a non-homework group consisting of 191 students. Each teacher involved in the experiment taught a homework and a non-homework class. Mason found no significant difference in achievement between the two treatment groups. He concluded that each teacher should determine which method is best.[18]

In 1967, Ten Brinke studied the effect of homework on achievement in mathematics in grades seven and eight. This study was conducted for a period of seven months at the University High School at the University of Minnesota in Minneapolis. The homework class had daily assignments to be completed outside of class. After correcting these assignments, they were collected at the beginning of next class. The supervised class had shortened assignments midway through class, which allowed the rest of the class time to be used

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[17] Ibid., p. 8.

[18] Ibid.

for supervised study. Statistical analyses revealed no significant differences in mean achievements between homework and supervised homework in areas of computation, problem-solving and facts. "Some evidence indicated a differential effect of homework toward superior achievement for upper ability students and of supervised study toward superior achievement for low-ability students."[19]

In 1971, Laing reported no significant difference in achievement or retention when practice on a topic was massed in one homework assignment or distributed over several assignments. There was a consistent trend favoring distributed practice of homework assignments.[20]

In 1971, Uriveller assigned homework containing problems on previously taught topics as well as problems on new material. For another group, problems were assigned only on new material. The group which had homework assigned on previously taught topics as well as on new material achieved and retained more than the group who were assigned problems only on new material.[21]

In 1971, Gray and Allison conducted an eight week study on the effects of homework on achievement for sixth grade

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[19]Ibid., p. 9.

[20]Dirk Pieter Ten Brinke, "Homework: An Experimental Evaluation of the effect of Achievement in Mathematics in Grades Seven and Eight," Dissertation Abstracts, 27A: 4176 June, 1967.

[21]Kenneth J. Travers, Len Pikaart, Marilyn N. Swydan and Garth E. Runion, Mathematics Teaching (New York: Harper and Row, Publishers, 1977) p. 207.

students. Treatment I had regular class instructions with no homework assignments. Treatment II had similar class instructions and in addition had three twenty-three minute homework assignments each week. No significant statistical difference between the two groups was found in understanding subject matter or in computational skills.[22]

In 1972, Taylor compared the effects of homework assignments on achievements and attitudes of Geometry I and Algebra I students. He used two treatment groups. In one group homework was required; whereas, in the other group homework was not required. The results showed that compulsory homework could not be justified solely on the basis of increasing achievement and attitude scores. The results of questionnaires sent to parents and students indicated that they preferred required homework assignments.[23]

In 1972 Hansen studied the effects of homework in trigonometry and calculus classes. One group was assigned homework which was taken up, graded and returned. The other group was not assigned any homework. No significant difference in achievement between the two groups was found using data obtained from tests given as a pretest and as a posttest. Hansen kept a daily log on each student's study time since the last class meeting. He discovered that the homework students spent longer periods of time studying than did the

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[22]Friesen,, The Results of Homework versus no Homework Research Studies, p. 10.

[23]Ibid., p. 11.

no homework students. The homework students also reported fewer days of no study and more days of uninterrupted study.[24]

In 1974, Schmidt compared the effects of compulsory homework without quizzes to the effect of non-compulsory homework with quizzes on achievement and attitude. No statistically significant difference was found in achievement or attitude between compulsory homework without quizzes and non-compulsory homework with quizzes.[25]

A ninth grade Fundamental Mathematics class was examined by Parrish in 1976. He studied homework and the effects of homework upon achievement and attitude toward mathematics. The students in the homework group achieved at a significantly higher level than those in the no homework group. No significant difference in attitudes towards mathematics between the two treatment groups was found.[26]

Despite the results of research, many mathematics teachers assume that homework is an integral part of any mathematics course and regularly assign homework. Some schools even have an administrative policy which requires teachers to assign homework.[27]

Courses on teaching mathematics often present a view strongly in favor of homework. One such example is found in Guidelines for Teaching Mathematics, which is a sample of an

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[25]Ibid., p. 13.

[26]Ibid.

[27]Federick H. Bell, Teaching and Learning Mathematics In Secondary Schools (np: Wm. C. Brown Co. 1978), p. 390.

explanation that a mathematics teacher could give to his class concerning homework.

> One final word about homework. Homework is important. I do not assign it merely to keep you out of trouble in study halls. It is assigned to help you learn mathematics and to give direction in independent study - that is a necessary part of learning the mathematics in this course. In fact, it might well be the most important part of the course for you. Don't shortchange yourself by failing to put real effort into this.[28]

Another textbook on teaching mathematics states that "a major purpose of the homework assignments is to provide opportunities to sharpen skills, develop understandings and improve problem-solving abilities."[29]

Some of the textbooks on teaching mathematics do contain sections on the resear h on homework but the findings are not conclusive. The authors of Mathematics Teaching feel that the findings of homework studies may be inconsistent because the cumulative effect of homework is not adequately studied.[30] The author of Teaching and Learning Mathematics feels that inconsistent findings on the effects of homework on achievement may be a result of poorly chosen homework assignments, casual attitude of teachers concerning homework, and that doing homework assignments is outside the control of the teachers.[31]

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[28]Gerald R. Rising and Donavan A. Johnson, Guidelines for Teaching Mathematics (Belmont, Calif.: Wadsworth Pub. Co., Inc., 1967) p. 351.

[29]Travers, Mathematics Teaching, p. 204.

[30]Ibid., p. 207.

[31]Bell, Teaching and Learning Mathematics, p. 390.

Since very few inferences can be made based on the research of the effects of homework on achievements, perhaps the attitudes of parents, students, and teachers concerning homework could contribute knowledge to help us determine the effect of homework assignments upon achievement. Do parents feel that homework is important? Do students feel that homework improves their grades?

Langdon and Stout in 1963 researched the feelings of parents concerning homework. They discovered that parents felt that homework:

1) developed self-discipline
2) enriched the experience of the schoolday
3) provided opportunities for independent study
4) helped to draw home and school together[32]

In 1965, Hudson surveyed attitudes of sixth, eighth, and eleventh grade pupils, their parents and teachers concerning homework. One discovery was that students, parents and teachers agreed that time spent in completing homework should increase as a student progressed through school.[33]

A homework questionnaire was given to 748 sixth, seventh, and eighth grade students by Kerzig in 1966. "About 70 percent of the students felt that homework helped them achieve better grades in mathematics."[34]

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[32]Charles D. Friesen, The Result of Surveys, Questionnaires and Polls Regarding Homework (Bethesda, MD.: ERIC Document Reproduction Service, ED 159 174, 1978), p. 4.

[33]Ibid.

[34]Ibid., p. 5.

A national survey of public high school mathematics teachers was conducted in 1977 by Maffei. He wanted to measure the teachers' perceptions concerning high school mathematical achievements. Of the sampled teachers, 79 percent felt there "had been a recent decline in the mathematical achievement of high school students." Several reasons for the decline were given and among them was the issue of homework. "The teachers felt that students were less likely to discipline themselves to study and do their homework."[35]

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[35]Ibid., p. 11.

CHAPTER III

METHODOLOGY

Sample

The sample for this study consisted of students enrolled in two Algebra I classes during the 1979-80 school year. Those classes were taught at Warren Central High School located in Bowling Green, Kentucky. The two algebra classes were chosen for the study because they were the only algebra classes assigned to the investigator that school year. One of the Algebra classes met during the third period which was just prior to their lunch period. At the beginning of the year, the third period algebra class had twenty-one students. Two students withdrew before the study was completed. The other algebra class in the study met during the sixth period which was the last period of the day. Twenty-three students were enrolled in the sixth period algebra class at the beginning of the school year. Four students withdrew before the study was completed. Complete data were available for the remaining nineteen students in each class.

In April of the 1978-79 school year, all eighth grade students enrolled in Warren Central feeder schools were given a mathematics test. The test was developed by the Warren Central High School mathematics department. The purpose of the test was to assist in placing the incoming freshmen in

an appropriate mathematics class either Fundamental Mathematics I, General Mathematics I, or Algebra I. The placement test consisted of two sections. The sections represented different levels of mathematical achievement. The first section representing the lower level of mathematical ability contained thirty-six problems involving basic operations in whole numbers and basic skills in fractions. The second section contained fifty-five problems involving word problems and basic operations on rational numbers in fractions, decimal and percent form..

The recommendations of the eighth grade teacher concerning the student's ninth grade mathematics placement was written on the front of the test.

An incoming freshman was recommended for Algebra I if he worked at least eighty percent of the first thirty-six problems and at least eighty percent of the next fifty-five problems correctly. If a student had marginal performance on the test, the Warren Central mathematics department head had the responsibility for making the placement recommendation. The recommendation was based on the eighth grade teacher's recommendation and the test scores. If the student was recommended for Algebra I, then he had the option of enrolling in Algebra I.

If a ninth grade student in a General Mathematics I class achieved an A or B grade and received a favorable recommendation from his general mathematics teacher, he was encouraged to take Algebra I during his sophomore year.

If a student transferred in to the Warren County school district, the guidance counselor made the recommendation regarding the student's enrollment in an Algebra I class. The recommendation was based on the student's scholastic record.

The transfer students' programs were scheduled manually; whereas, the students' programs from the Warren Central feeder schools and the General Mathematics I classes at Warren Central High School were scheduled by computer.

Procedure

The third period algebra class began the school year with the treatment referred to as Required Homework Review. The students in this treatment group were shown the solution of each problem from the homework assignment of the previous day. Usually the teacher explained each problem using the overhead projector. However, in some cases students were selected to work the problems on the chalkboard and explain the solutions. This presentation of homework problems required approximately thirty-five minutes of the class period. The remainder of the class time was devoted to the explanation of new material and assigning the homework.

The sixth period class began the school year with the treatment referred to as Review On Request. At the beginning of each class, approximately twenty minutes were devoted to explaining the solutions to the homework problems requested by the students. An overhead projector was used by the teacher in explaining the solution to the requested problems.

A list of the problems that students inquired about was kept by the teacher. During the next twenty minutes of the class period, the new material was presented. The presentation of the new material consisted primarily of explanations and working sample problems using the overhead projector. After the presentation, the homework assignment was made and the students were given the remainder of the class period to work on the homework problems. The students were encouraged to seek assistance from the teacher if difficulties were encountered while attempting to work the problems.

In both treatment groups, the homework papers were collected each day after the problems were reviewed. The homework papers were graded, recorded and used in determining the letter grades for the students at the end of each grading period. The students who wished to have their homework papers returned were instructed to write "KEEP" at the top of their homework papers. Otherwise the papers were discarded.

The presentations of new materials for the two classes were as similar as possible. The homework assignments for both classes were the same.

Throughout the school year, the experimental treatments were rotated between the two classes. When the third period class was receiving Required Homework Review treatment the sixth period class was receiving the Review On Request treatment. At the end of each unit the treatments were exchanged.

At the end of each unit of study the same unit test was administered to both classes. The tests were announced two to four days in advance allowing the students sufficient time to prepare for the test and make arrangements to be present that day. Students with excused absences were administered the tests when they returned. An excused absence was an absence because of illness or death in the family.

Daily lesson plans were carefully designed to meet the objectives of the course. These plans were essential to assure that both classes differed only in terms of the treatment variable.

The total mathematics and total battery scores from the Comprehensive Tests of Basic Skills (CTBS) was obtained from the students' permanent record cards. The CTBS is administered annually near the end of the eighth grade school year. The scores used in this study were obtained from the students' eighth grade CTBS score.

A brief questionnaire was developed to measure the student's preference relative to the method of reviewing homework. Instructions needed for filling out the questionnaire were given orally. Then the questionnaires were distributed; and after allowing ample time for the student to answer the questions, they were collected.

Instrumentation

The teacher-made unit achievement tests were designed to have content validity. They were carefully designed by the teacher to measure the objectives of each unit. The unit tests varied from ten problems to forty problems. Total

points possible on each test was set at 100. The average unit test score was sixty-seven. However, there were two unit tests on application problems during the school year that had very low averages. If those two test averages were not considered in the total average test score the average test score would be seventy-three.

The CTBS was designed to measure basic skills on a wide variety of students. The test was divided irto four major sections - reading, mathematics, language and study skills. Each of the major sections was subdivided into two or three subtests. The CTBS tests consisted of multiple choice questions for the student to select the correct or "best" answer from four or five options. The validity of the test is high. One study of the degree of relationships between similar tests yielded correlations as high as .93. Most correlations were between .70 and .85. A high degree of reliability exists for the total scores and for the subtest scores. Most Kuder Richardson Formula 20 reliability coeffieients were in the .85 - .95 range.[1] Therefore, it was concluded that the CTBS test was valid and reliable for the purposes of the study and subjects in the study.

A brief questionnaire was developed to determine the student's attitudes concerning achievement, interest and usefulness. The questionnaire consisted of eleven statements. The student was asked to circle agree, disagree or undecided.

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[1]Oscar Krisen Buros, The Seventh Mental Measurement Yearbook, vol. 1 (Highland Park, New Jersey: The Gryphon Press, 1972), p. 8-9.

At the end of those statements the student was to circle which review method he preferred - Required Homework Review or Review on Request. The questionnaire appears in the appendix.

Data Analysis

In all, fourteen teacher-made unit tests were administered to the two algebra classes in the study. The students' scores from the two combined classes for each of the fourteen tests were placed in frequency distributions. The fourteen frequency distributions were analyzed. These distributions varied in terms of their means, standard deviations, and the shapes of the frequency distribution curves. Since the measure of an individual's achievement associated with a specific homework review technique was to be the sum of his/her seven unit scores, it was necessary to produce comparable scores. Scores are comparable if they come from distributions having the same mean, standard deviation, and frequency distribution shape. To make the scores comparable the raw scores from each unit test for the combined classes were transformed into T-scores. These T-scores were normally distributed with a mean of fifty and a standard deviation of ten.

Each student had fourteen T-scores, seven T-scores representing achievement under each of the two treatments. Summing the seven scores representing achievement in units in which the student had the same treatment represented the student's achievement for that treatment. Therefore, each student had two scores representing achievement under the two

different treatments. These scores were the scores that were used in the tests of significance, analysis of covariance and correlated T-test.

Students were not randomly assigned to the treatment groups. In order to correct for initial differences between groups, the total mathematics scores and the total battery scores from the CTBS test were used as covariables in the analysis of covariance. The correlated t-test was used in comparing the achievement of a class under one treatment with its achievement under the other treatment. Two tests were necessary - one for the third period class and one for the sixth period class.

Analysis of covariance was used to test for significance of difference in achievement between the third period class using one treatment and the sixth period class using the other treatment. Two comparisons were required to provide for the two variations of the treatment variable. In each comparison, the independent variable was the method of homework review, the dependent variable was achievement and the covariables were total mathematics and total battery scores from CTBS.

In the analysis of results from the questionnaires, percentages were computed.

CHAPTER IV

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Introduction

During the 1979-80 school year, two Algebra I classes were involved in a study to test the effects of two methods for reviewing homework problems on students' achievements and attitudes. One review procedure was to solve and explain each problem during the class period that followed the class period in which the homework assignment had been made. The other procedure involved solving and explaining only the problems that students requested to have reviewed. While one procedure was being used with one class, the other procedure was being used with the comparison class. One treatment was used with a class until a unit of work was completed. Generally it required ten class periods to complete a unit. After a unit was completed a teacher-made, achievement test was administered to the students in both classes. The raw scores were normalized with a mean of fifty and a standard deviation of ten. At the beginning of the next unit the review procedures were alternated between the two classes. The two classes covered fourteen units during the experimental period.

At the conclusion of the study, each student had fourteen normalized achievement scores on record. The analyses of these

scores are contained in this chapter. The first analysis compares the effect of the review procedures on achievement within each class. The second analysis compares the effect of the review procedures on achievement between classes.

A survey to obtain the attitudes of students toward the two procedures was conducted at the conclusion of the experimental period. An analysis of the results from the survey is presented in this chapter.

Data are presented in this chapter as to the percentage of total homework problems that were requested for review.

Findings

The results of the t-test for correlated means that compared the effects of Required Homework Review versus Review on Request for the third period algebra students appear in Table 1.

TABLE 1

THE RESULTS OF TEST OF SIGNIFICANCE OF DIFFERENCE IN MEAN ACHIEVEMENT FOR THIRD PERIOD ALGEBRA CLASS USING TREATMENT 1 AND TREATMENT 2

Variable	No. of Cases	Mean	(Difference) Mean	Corr.	2-Tail Prob.	t Value	2-Tail Prob.
Treatment 1	19	357.7564	5.6747	0.913	0.000	0.97	0.345
Treatment 2		352.0817					

The students in the third period algebra class had slightly higher achievement when all homework problems were solved and reviewed in class. The average achievement for Required Homework Review (Treatment 1) was 357.7564. The

average achievement for Review on Request (Treatment 2) was 352.0817.

The t-test for correlated means was the statistical test for analyzing the difference between the mean achievement scores. The result of the analysis indicated that the difference was not significant at the 0.10 level of significance.

The results of the t-test for correlated means that compared the effects of Required Homework Review versus Review on Request for the sixth period algebra students appear in Table 2.

TABLE 2

THE RESULTS OF TEST OF SIGNIFICANCE OF DIFFERENCE IN MEAN ACHIEVEMENT FOR SIXTH PERIOD ALGEBRA CLASS USING TREATMENT 1 AND TREATMENT 2

Variable	Sum of Cases	Mean	(Difference) Mean	Corr.	2-Tail Prob.	t Value	2-Tail Prob.
Treatment 1	19	347.9173	5.6745	0.888	0.000	1.10	0.285
Treatment 2		342.2428					

The students in the sixth period on the average had higher achievement for units in which all the homework problems were solved and explained. The average achievement for units in which all of the homework problems were solved and explained, Required Homework Review, was 347.9173. The average achievement for the units having Review on Request was 342.2428.

The t-test for correlated means indicated that the difference was not significant at the 0.10 level of significance.

Analysis of covariance was the statistical method used for testing the null hypothesis of no significant difference in achievement between the classes when the review procedures being used for the classes were different. The covariables in the analysis were the total mathematics subscores and the total battery scores from the Comprehensive Test of Basic Skills (CTBS).

In the first analysis between classes, the scores from units with Required Homework Review for the third period algebra class were compared to the scores from units with Review on Request for the sixth period algebra class. The results of the analysis appear in Table 3.

TABLE 3

THE RESULTS OF TEST OF SIGNIFICANCE OF DIFFERENCE IN MEAN ACHIEVEMENT BETWEEN THIRD PERIOD HAVING TREATMENT 1 AND SIXTH PERIOD HAVING TREATMENT 2 AFTER ADJUSTING FOR TOTAL MATH SCORE AND TOTAL BATTERY SCORE FROM CTBS

Source of Variation	Sum of Squares	df	Mean Square	F	Signif of F
Covariates	33468.441	2	16734.219	8.887	0.001
Math	11662.914	1	11662.914	6.194	0.018
Battery	808.613	1	808.613	0.429	0.517
Main Effects	2102.094	1	2102.094	1.116	0.298
Explained	35570.535	3	11856.844	6.297	0.002
Residual	64022.590	34	1883.017	...	...
Total	99593.125	37	2691.706	...	...

The mean achievement score of the third period algebra class was higher than the mean achievement score of the sixth hour class. The analysis of covariance indicated that the relationship between the covariables and achievement was significant but the difference between classes attributed to the review method was not significant at the 0.10 level of significance.

In the second analysis between classes, the scores from units with Review on Request for the third period algebra class were compared to the scores from units with Required Homework Review for the sixth period algebra class. The results of the analysis appear in Table 4.

TABLE 4

THE RESULTS OF TEST OF SIGNIFICANCE OF DIFFERENCE IN MEAN ACHIEVEMENT BETWEEN THIRD PERIOD HAVING TREATMENT 2 AND SIXTH PERIOD HAVING TREATMENT 1 AFTER ADJUSTING FOR TOTAL MATH SCORE AND TOTAL BATTERY SCORE FROM CTBS

Source of Variation	Sum of Squares	df	Mean Square	F	Signif of F
Covariates	55611.383	2	27805.691	17.137	0.000
Math	12192.496	1	12192.496	7.515	0.010
Battery	4863.840	1	4863.840	2.998	0.092
Main Effects	238.883	1	238.883	0.147	0.704
Explained	55850.266	3	18616.754	11.474	0.000
Residual	55165.359	34	1622.510	...	...
Total	111015.625	37	3000.422	...	...

The mean achievement score of the third period algebra class was higher than the mean achievement score of the sixth period class. The analysis of covariance indicated that the relationship between the covariables and achievement was significant but the difference between classes attributed to the review method was not significant at the 0.10 level of significance.

In the questionnaire administered at the conclusion of the study it was found that eighty-six percent of the students preferred the Review on Request method and fourteen percent preferred the Required Homework Review method. The results of the questionnaire appear in the Appendix.

Throughout the year a record was kept of the number of problems the students requested in the Review on Request treatment. The third period algebra class requested sixteen percent of the problems assigned. The sixth period class requested thirty-four percent of the problems assigned.

Conclusions

The following conclusions are based upon the review of related research reported in Chapter II and the findings from this study.

Homework is necessary for the mastery of content of Algebra I. Homework enables the student to have the necessary drill to attain understanding of the concepts in Algebra I.

The method for reviewing assigned homework should be a combination of the two methods described in this study - Required Homework Review and Review on Request. In the

Required Homework Review all of the assigned homework problems would be explained in class. In the Review on Request only those problems the students requested would be explained.

Some sections of Algebra I are more difficult for students to grasp than other sections. Since the achievement of the students was as high or higher using the Required Homework Review the more difficult sections should be reviewed using the Required Homework Review. The Required Homework Review allows for additional explanation and time enabling the student to better understand the material.

For remaining sections of Algebra I the review of homework should be Review on Request. Students have demonstrated a preference for Review on Request rather than Required Homework Review. By yielding to the students' preference their motivation to do their homework will be higher. The result should be higher achievement and generally better attitudes toward algebra.

The Algebra I teacher should review the content to determine which sections in Algebra I are more difficult for the student. The homework sections that are more difficult and need more explanation should be reviewed using the Required Homework Review. At the beginning of the course the teacher should explain the homework review procedures to the students so the students can understand the class format.

Recommendations

Recommendations were made concerning needed research on the basis of the findings and conclusions of this study.

The following recommendations are made:

1) A similar study be conducted for a randomized sample of Algebra I students to minimize the effects of other systematic difference between groups other than treatment.

2) A study to determine the effects of rotating methods of homework review.

3) A study be conducted to investigate the overwhelming popularity of Review on Request when the students tended to do better with Required Homework Review.

4) A study involving the individual and combined effects being covered and type of homework review and its effect upon achievement.

APPENDIX 1

ALGEBRA I QUESTIONNAIRE

Throughout the year, the teaching method in Algebra I has rotated. One method was the Required Homework Review (RHR) where all the homework was worked in class. The other method Review on Request (RR) the student request which problems he wanted explained. In this RR method after the presentation of new material the students had about twenty minutes in a class period to work on their homework assignment.

The following are questions concerning your reaction to the two methods. If you agree with the statement circle 1. If you disagree circle 2 and if you are undecided circle 3.

	Agree	Disagree	Undecided
1. I learned more in the RHR method than the RR method.	1(15.4%)	2(66.7%)	3(18%)
2. The RHR method was boring.	1(66.7%)	2(20.5%)	3(12.8%)
3. With RHR, I was able to complete my homework.	1(23%)	2(56.4%)	3(20.5%)
4. With the RHR, I was not able to grasp the necessary concepts to complete my homework.	1(43.5%)	2(35.8%)	3(20.5%)
5. After reviewing all the homework in RHR, I understood the homework problems.	1(58.9%)	2(28.2%)	3(12.8%)
6. I sought more outside help from a friend, parent, tutor with the RHR method than the RR method.	1(51.2%)	2(30.7%)	3(17.9%)
7. I learned more in the RR method than the RHR method.	1(61.5%)	2(20.5%)	3(17.9%)
8. The RR method was boring.	1(2.5%)	2(74.3%)	3(23%)
9. With the RR method I was able to complete all my homework.	1(61.5%)	2(20.5%)	3(17.9%)

	Agree	Disagree	Undecided
10. With the RR method I was not able to grasp the necessary concepts to complete my homework.	1(5.1%)	2(76.9%)	3(17.9%)
11. After reviewing the problems that were requested in RR, I understood the homework problems.	1(74.3%)	2(12.8%)	3(12.8%)

CIRCLE ONE: If I had a choice I would choose the (RHR, RR) teaching method for my next algebra class.

(RHR 14%) (RR 86%)

The numbers in parenthesis are the results from the questionnaire.

BIBLIOGRAPHY

Bell, Federick H. Teaching and Learning Mathematics (In Secondary Schools), n.p. Wm. C. Brown, 1978.

Buros, Oscar Krisen. The Seventh Mental Measurement Yearbook, vol. 1 (Highland Park, New Jersey: The Gryphon Press, 1972), p. 8-9.

Crocker, Helen. Western Kentucky University, Bowling Green, Kentucky, 28 July 1979.

Friesen, Charles D. The Results of Homework versus no-Homework Research Studies. (Bethesda, MD: ERIC Document Reproduction Service, ED 167 508, 1979.

Friesen, Charles D. The Results of Surveys, Questionnaires and Polls Regarding Homework. Bethesda, MD: ERIC Document Reproductions Service, ED 159 174, 1978.

Rising, Gerald R., and Johnson, Donovan A. Guidelines for Teaching Mathematics. Belmont, Calif.: Wadsworth Pub. Co. Inc., 1967.

Ten Brinke, Dirk Pieter, "Homework: An Experimental Evaluation of the Effect of Achievement in Mathematics in Grades Seven and Eight," Dissertation Abstracts, 27A: 4175, June, 1967.

Travers, Kenneth J.: Pikaart, Len; Suydam, Marilyn N.; and Runion, Garth E. Mathematics Teaching. New York: Harper and Row, 1977.